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A NOTE ON THE DIATOM *THALASSIOTHRIX VANHOEFFENI* HEIDEN & KOLBE, WITH REFERENCE TO SPECIMENS FOUND IN THE AGULHAS CURRENT

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ABSTRACT

An account is given of variations in the morphology of specimens of the diatom *Thalassiothrix vanhoeffeni* Heiden & Kolbe found in the Agulhas current, together with electron micrographs of part of the valve of a specimen.

UITTREKSEL

AANTEKENINGE OOR DIE DIATOOM *THALASSIOTHRIX VANHOEFFENI* HEIDEN & KOLBE, MET VERWYSING NA MONSTERS WAT IN DIE AGULHAS SEESTROOM GEVIND IS. Die verslag handel oor verskille in die morfologie van sekere monsters van die diatoom *Thalassiothrix vanhoeffeni* Heiden & Kolbe, wat in die Agulhas seestroom gevind word, tesame met elektron mikrograwe van 'n gedeelte van die monster se klep.

INTRODUCTION

Thalassiothrix vanhoeffeni was first described by Heiden and Kolbe (1928) from Atlantic samples from latitudes 8° 5′ S. to 30° 49′ S. The type description is given below:

"Valves linear, at one end bluntly rounded, with a bordered pore and stigma, at the other end tapering, wedge-shaped, rounded with a stigma; length 990–2040μ, valve width 3μ. Valve with short marginal grooves on both sides, 85–100 in 100μ, each with a granule. The pseudoraphe is linear, $\frac{1}{3}$ of the valve width, abruptly narrowed at the wedge-shaped end. At the blunt end of the valve, there are short marginal striae instead of marginal grooves, at the other end, fine puncta over the whole surface of the valve. Girdle width 4–6,6μ, with one end wedge-shaped and pointed, the other truncated, slightly constricted. The marginal grooves on the valve extend onto the girdle side. The cells are rectangular in transverse section and sometimes twisted up to 90° about the longitudinal axis."

The only other illustration of *T. vanhoeffeni* appears to be that of Hasle (1960) and the only other records of the species are in checklists of Taylor (1967) and Thorrington-Smith (1969).

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Taylor (1964 Ph.D. Thesis) recorded the species in samples from only two stations in the S.W. Indian Ocean, but suggested that *T. vanhoeffeni* could be confused with *T. acuta* Karsten. Karsten (1905) described *T. acuta* as follows: "4–5: 1600μ. Cell twisted so that one end shows the valve side, the other the girdle side; thus this belongs to the genus *Thalassiothrix*. Both valve ends pointed. Valves with pseudoraphe and 11–12 transverse striae in 10μ." The figure shows the pointed or foot end in valve view, with transverse striae extending right to the apex and the pseudoraphe a thin line. Hendy (1937) described *T. acuta* as having a "narrow and indistinct pseudoraphe". Thus only in the number of transverse striae in 10μ is there any similarity between the two species. *T. acuta* was not found in samples from Agulhas current NGY stations, but it has been recorded in checklists for the W. and S.W. Indian by Taylor (1967), Nel (1968) and Thorrington-Smith (1969 and 1970).

There are some features of similarity between *T. vanhoeffeni* and *T. elongata* Grunow ex Allen & Cupp. *T. elongata* appears to have been illustrated only twice and both figures are unfortunately poor. The description of Allen and Cupp (1935) is given: "Cells single threadlike. Valves very long, slightly curved; one end slightly pointed, the other rounded. Marginal striae 9–14 in 10μ . . . Length 1054–1260μ; width 3–4μ." Allen and Cupp considered *T. elongata* "closely related to or possibly a synonym of the usually more northerly *T. longissima* Cl. & Grun." The only other records of *T. elongata* appear to be in checklists of Wood (1962) and Nel (1968).

T. vanhoeffeni in NGY SAMPLES FROM THE AGULHAS CURRENT

Cells agreeing with Heiden and Kolbe's description of *T. vanhoeffeni* were found at 61 out of 76 samples from NGY stations in the Agulhas current collected during International Geophysical Year 1958. (For the hydrographic data of the NGY stations see Zoutendyk 1960.)

Calculating frequency as a percentage for each sample, the maximum percentage frequency for *T. vanhoeffeni* was 2%; in half of the samples in which it was recorded, it was 0,33% or less.

The specimens attributed to *T. vanhoeffeni* differ from Heiden and Kolbe's

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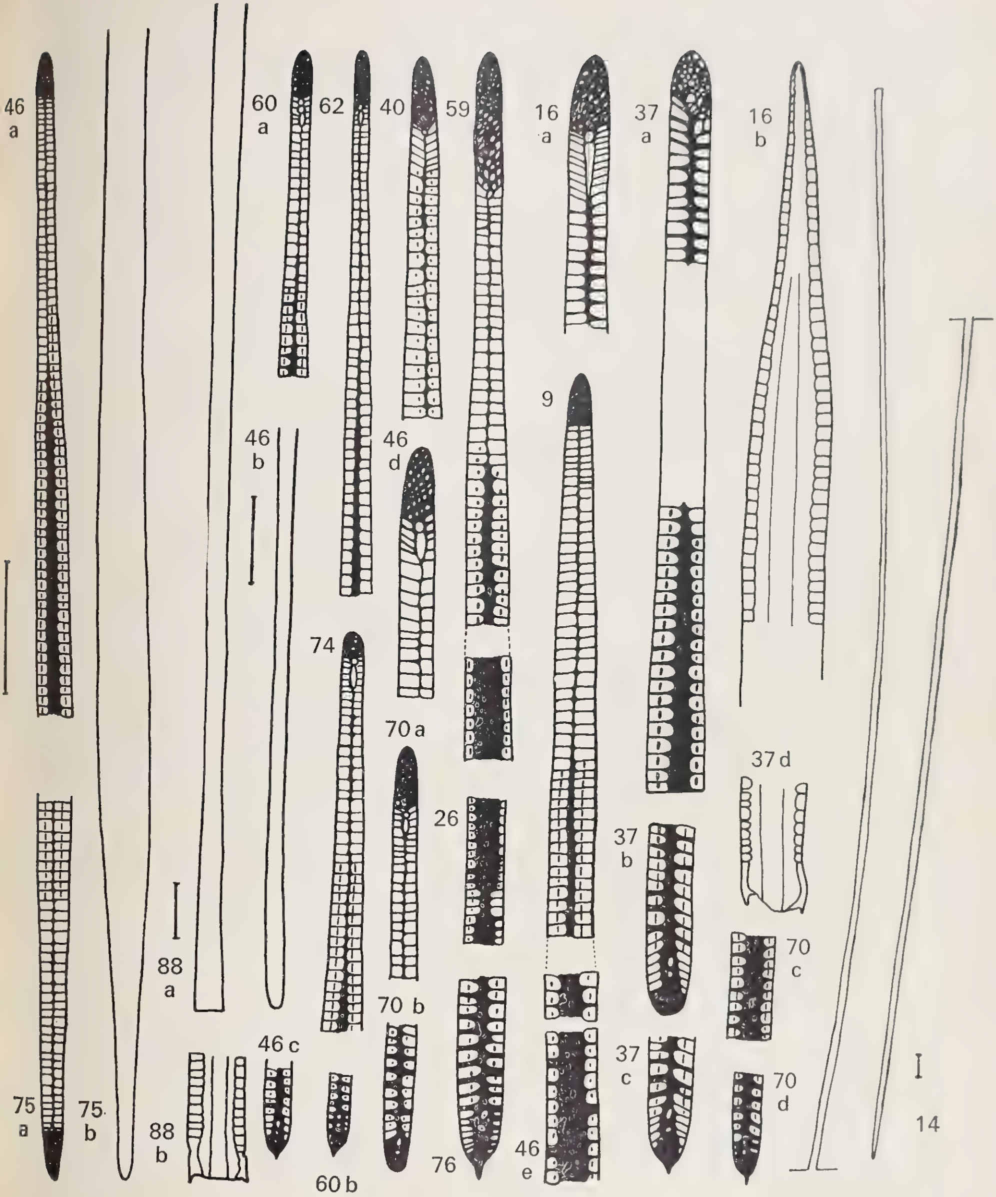
FIG. 1.

Thalassiothrix vanhoeffeni. (Specimens numbered according to NGY stations at which they were found.) *14*, entire cell in girdle view; *9*, *40*, *59*, *62* and *74*, valve views of foot or basal end showing variation in patterning of apical part of valve; *26*, valve view of mid valve showing unusual long marginal grooves; *76* valve view of head end; *16 a* and *b*, valve and girdle view of foot; *37 a*, foot, *b* and *c*, head ends of valves, of same cell; *d* head end in girdle view; *46 a*, foot end; *b* and *c*, head end of second cell; *d* and *e*, foot and mid cell in valve view of third specimen; *60 a* and *b*, foot and valve of same cell; *70 a*, *b* and *c*, foot, head and mid body of same cell; *d*, foot of second cell; *75 a* and *b*, foot in valve and outline girdle view; *88 a* and *b*, head in girdle view. The scale line indicates 10μ. Camera lucida drawings, all to same scale except *14*, *46 b* and *88 a*.


46 a
75 a
75 b
88 a
88 b
60 a
46 b
46 c
62
74
60 b
40
46 d
70 a
70 b
59
26
76
16 a
9
46 e
37 a
37 b
37 c
16 b
37 d
70 c
70 d
14

original description in showing a greater range in the number of marginal markings in 10μ, and variability in the valve markings in the region of the foot.

Expanded description of *T. vanhoeffeni* Heiden & Kolbe (See Fig. 1)

T. vanhoeffeni differs from other species of *Thalassiothrix* in the slighter torsion and curvature of the cell, in the number of marginal markings or grooves per 10μ, in the presence of an elongated bar in each groove, in the absence of marginal spines, in the broad central area and in the valve structure in the region of the foot.

Torsion of cell: the cell may be curved in a slight arc and slightly twisted about the longitudinal axis, but only in one instance was this torsion as much as 90°, so that one end of the cell was seen in girdle view, the other in valve view.

Length of cell: 621–2070μ.

Dimensions and shape in girdle view: the head of the cell is truncate, 3,2–6,0μ wide at the end, tapering over 50–70μ to a width of 2,4–3,6μ; the cell then enlarges gradually to a maximum girdle width of 3,2–8,0μ and tapers gradually to a width of 2,8–5,6μ at a distance of 130–300μ from the posterior or basal end, also referred to as the foot, enlarging again to a width of 3,6–6,4μ and then tapering over a distance of 25–35μ to a somewhat drawn-out point.

Dimensions and shape in valve view: the head is rounded, 2,5–4,0μ wide, narrowing at about 50–70μ behind the tip to a width of 1,5–3,0μ, then enlarging gradually to a width of 3,0–4,5μ and tapering again towards the basal foot with the valve width of the attenuated end 1,5–4,0μ; the end of the foot is rounded.

Markings of valve: the valve is ornamented by what Heiden and Kolbe termed "marginal grooves", and in descriptions of other species of *Thalassiothrix* are referred to as transverse or marginal striae, which extend onto the mantle; each groove has an elongated bar, referred to by Heiden and Kolbe as a "granule". The marginal grooves border a central unmarked area, referred to as the pseudoraphe by earlier authors, but better termed the central area, occupying two thirds of the valve width for most of the valve length, but narrowing abruptly in the region of the foot, in the attenuated part of which it becomes a thin line bordered by marginal grooves in which the "granule" is indiscernible. The valve markings of the apical part of the foot vary: the central area may be terminated by an elongated "patch", the "stigma" of Heiden and Kolbe, with a rounded "patch" lying immediately in front of it; sometimes only one of the patches terminating the central area is present, sometimes neither is discernible under the light microscope; beyond this, the rest of the valve is marked all over with small puncta, whose size, arrangement and number are generally not easily seen. In the region of the head, the central area does not narrow much, and it is terminated by a round "patch", the "pore" of Heiden and Kolbe, generally immediately anterior to an elongated or rounded "stigma"; the former is always present, but the position and presence of the latter varies; the patterning of the valve beyond this is not easily seen: it appears to consist of smaller, less regularly arranged marginal puncta. The apex of the head may bear a single small spine. The number of marginal grooves in 10μ varies from 8–9 in a specimen to 13–14 in a specimen, mostly 11, with the marginal grooves in 10μ more numerous in the region of the foot. Gaps in the marginal grooves may occur, and rarely, a few grooves are found, projecting into the central area.

ELECTRON MICROSCOPE OBSERVATIONS OF *T. vanhoeffeni*. (See Fig. 2.)

Hasle (1967) has shown that in *T. longissima* and *T. antarctica* Schimper, the transverse striae correspond to a series of marginal depressions, with less heavily silicified walls, seen in *T. longissima* to be thickened with a reticulate pattern, with an internal opening in each depression and with the concavity of the depression orientated towards the inside of the valve. The depressions alternate with narrow low marginal ribs.

Examination under the electron microscope of species never present in large numbers is difficult, and it was fortuitous that a portion of the foot end of a valve was included in an E.M. preparation.

In this specimen, in the region of the attenuated point, the marginal depressions did not appear to extend onto the mantle. Both the elongated "stigma" and round "patch" terminating the central area were present, but the tip of the valve posterior to this was broken. Where the central area began to widen, the marginal depressions extended onto the mantle and were traversed by bars of wall material of the same density as the central area and parallel to it. These bars were incomplete in the first few depressions, but anteriorly they divided each depression into three compartments, two of which would be visible in valve view under the light microscope, the dividing bar forming the "granule" of Heiden and Kolbe. The wall between the marginal depressions appeared to be slightly denser than the central area, but not raised in transverse ribs as in *T. antarctica* (Hasle l.c. fig. 45). The much thinner wall of the marginal depressions had disintegrated in most depressions and it was not possible to see the exact nature of the thickening, or the internal openings.

A second fragment was found, which could be a portion of the head end of a valve of *T. vanhoeffeni*, but this is by no means certain, as the central area was narrower than generally observed in specimens under the light microscope. The marginal depressions around the end of the central area were irregularly divided into a number of compartments by bars of wall material, less dense and at a slightly different level to the central area and the parts of the valve between

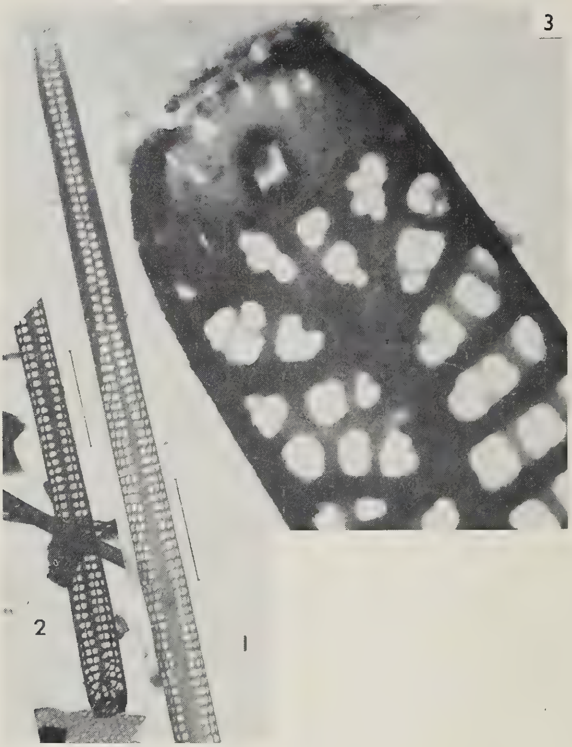


FIG. 2.

1. Electronmicrograph of foot or base end of valve of *T. vanhoeffeni,* apex of valve missing; 2, electronmicrograph of putative head end of valve of *T. vanhoeffeni;* 3, the same greatly enlarged. The scale line indicates 10μ.

the compartments. Each compartment was traversed by a ramification of even less dense wall material at yet a third level. A definite pore with a thickened rim was evident, posterior to which was a depression divided into two compartments, which under the light microscope might appear as the "stigma" of Heiden and Kolbe. The end of the valve was perforated by smaller pores, which in valve view under the light microscope would appear marginal. Further back, the depressions were divided into three compartments by bars parallel to the central area, and at about 18µ from the apex, into two compartments.

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